

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of: Barry Bronson

Art Unit: 2861

Examiner: Pham, Hai Chi

Serial Number: 10/663,399

Filed: Sept. 15, 2003

Title: LABELING APPARATUS AND METHOD FOR DISK
STORAGE MEDIA

Date: September 29, 2004

DECLARATION UNDER 37 CFR §1.131

As the Inventor and Applicant of the above patent application, I hereby declare that:

The original Invention Disclosure demonstrating conception of the invention for the above referenced application was submitted by me and received by the Hewlett-Packard Legal Department before the August 31, 2001 of the Hiotsune reference, US Patent No. 6,532,034B2 and the October 29, 2001 filing date of the Honda reference, US Patent Application Publication No. 2002/0191517A1. Due diligence was taken by me to the filing of the Application as shown by Exhibits A-J describe below. This Invention Disclosure, with dates redacted, is shown in Exhibit I.

✓ Exhibit J is a copy of the Request for Quote and Engagement Letter signed August 29, 2001 by the attorney assigned to write the case. This date is just prior to the August 31, 2001 filing date of the Hiotsune reference. Confirmation to proceed was given by the managing HP attorney on September 6, 2001.

✓ Exhibit H is a copy of the billing invoice from the Law Firm of the writing attorney showing the prior art search began on September 14, 2001 and that the attorney continued to diligently work on the case to prior to the October 29, 2001 filing date of the Honda reference.

✓ Exhibit A is a fax cover sheet dated 10/10/2001 (prior to 10/29/01 Honda date) from me to the Attorney writing the case describing the drawings received the day prior.

✓ Exhibit B is a copy of fax cover sheet dated 12/28/2001 indicating that a first draft of the patent application and hand drawings were sent to me that day.

BEST AVAILABLE COPY

Exhibit C is a copy of an email dated 12/28/2001 from the attorney writing the case to me confirming that a first draft of the patent application was being faxed.

Exhibit D is a copy of a letter dated 1/3/2002 from the attorney writing the case to me confirming that "a second draft" incorporating my feedback from the first draft was enclosed along with formal documents for signature.

Exhibit E is a copy of the "Filing Procedures Checklist" received 1/11/2002 (the filing date of my application) noting that the required date for receipt by HP and filing with the USPTO was 2/23/2002, which was 5 weeks after the actual filing date of 1/11/2002.

Exhibit F is a copy of the Express Mail receipt showing a date of 1/11/2002 of filing of the application with the US Postal Office and addressed to the Commissioner for Patents.

Exhibit G is a copy of a fax cover sheet dated 1/11/2002 from the attorney writing the case to the Patent Agent within HP responsible for the case indicating that the case was filed that day, and a copy of the patent application transmittal filed by express mail.

Exhibit H is a copy of the invoice submitted by the attorney writing the case showing the time spent working on the case. This document shows that the attorney interviewed me and completed the original draft of the Application on 10/11/2001 prior to the 10/29/01 filing date of Honda.

All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful statement may jeopardize the validity of the application or any patent issued therefrom.

Barry Bronson

 9-24-04

13750 Via Alto Court date
Saratoga, CA 95070

fax of drawings for PDNO 10008364.txt

From: Bronson, Barry
Sent: Wednesday, October 10, 2001 2:59 PM
To: 'Gregg Jansen'
Subject: fax of drawings for PDNO 10008364

Hello Gregg,

The 9 Oct. drawings look good. In figure 2, it should be pointed out that 121 and 221 can be independent or the same. Also, the image implies a screw drive that moves the heads. It could be desirable to move the screw in 121 or 221, while keeping 118/214 at a fixed location at the end of the screw. This would provide a means of getting the heads out of the way when a disk is inserted or removed.

Alternatively, we discussed use of a pivoted head assembly such as is used in hard disk drives. This could have advantages in being easier to swing out of the way for loading/unloading.

Regards,

Barry

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FACSIMILE INFORMATION SHEET

DATE: December 28, 2001

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THE FOLLOWING PAGES ARE FOR:

Individual: Susan E. Heminger
Company: Hewlett-Packard Company
Fax No.: 650/852-8063
Transmitting Party: Gregg Jansen
ROTHWELL, FIGG, ERNST & MANBECK

Total Number of Pages Transmitted, including this sheet: 26

RE: Labeling Apparatus and Method for Disk Storage Media
PDNO 10008364

Our ref.: NI424-037

To be Filed by: 02/23/2002

Message: Hi Sue:

Enclosed is a first draft of the patent application and hand drawings sent to the inventor today. Thanks.

Gregg

PDNO 10008364

LABELING APPARATUS AND METHOD FOR
DISK STORAGE MEDIA

By

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PDNO 10008364

FIELD OF THE INVENTION

[0001] The present invention relates generally to labeling for a computer disk storage media, and more particularly to labeling employing a computer disk drive.

BACKGROUND OF THE INVENTION

[0002] Increasingly large amounts of information are stored on various types of storage media. The popularity of larger and larger capacity storage media is growing due to increasing computer use. Therefore, many types of large data storage needs exist. Examples of situations where computer users need or desire large storage media are for holding database records, software programs, graphics, audio, video, etc. This increasing demand for digital storage media has resulted in the popularity of optical storage media, such as compact disks (CDs) and digital video disks or digital versatile disks (DVDs).

[0003] This need for data storage corresponds with a need for labeling of disk contents. The explosion of user writable optical media, such as writable CDs and the recent emergence of writable DVDs, has resulted in large quantities of user created disks.

[0004] In the prior art there are several approaches to disk labeling. The first and simplest prior art labeling approach is marking on the disk with a pen or marker. However, while being simple and fast, it has several drawbacks. It could damage the disk and it may increase the likelihood of read errors during use of the disk. In addition, the hand marking approach cannot record detailed or large amounts of information, is

PDNO 10008364

not as visually pleasing; generally does not allow for graphics, and may smudge and degrade over time.

[0005] A second approach to labeling is an adhesive label that may be independently created and stuck to the disk. The drawbacks of this approach is that extra effort is required by the person making such a label. Moreover, the creation of the label may be easily put off and forgotten because it may require too much effort to always be done at the time of disk creation recording. Moreover, it requires extra effort if additional information is later recorded onto the disk.

[0006] A third approach is a digital label approach wherein digital data is internally stored as part of the information on the disk and not on an external label. This may allow permanent marking and may allow for larger quantities of data. However, the drawbacks are that a person or user cannot visually read the label and must insert the disk into a disk drive to read the label.

[0007] A fourth approach is an approach illustrated in U.S. Patent No. 6,074,031 to Kahle, wherein a bubble jet or inkjet label printer is built into a disk drive. Although this allows a user to put large quantities of data on the label and allows it to be printed in a professional and neat manner, there are still several drawbacks. One drawback is that it is expensive. This prior art approach adds to the cost of a disk drive and requires frequent re-supply of materials such as ink or ink cartridges. Furthermore, it will increase the size of the disk drive. Another drawback is that the ink from the label printer may get into the drive mechanism and may foul the read and writing lasers of the disk drive. Yet another drawback is a recurring effort of maintaining and resupplying ink

PDNO 10008364

to the label printer. Yet another drawback is that heat in the drive mechanism may dry out the ink.

[0008] Therefore, there remains a need in the art for improvements to computer disk media labeling.

SUMMARY OF THE INVENTION

[0009] A label printer system comprises a disk storage medium including a thermally-sensitive layer formed on at least a portion of an upper surface. A rotational drive rotates the disk storage medium and a transverse drive moves a laser substantially transversely with respect to the disk storage medium. A memory includes a symbol set and a label printer driver. A processor uses the label printer driver to control the rotational drive and the transverse drive in order to thermally write the symbol set to the thermally-sensitive layer of the disk storage medium, using the laser.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] FIG. 1 is a schematic of a label printer system according to one embodiment of the invention;

[0011] FIG. 2 is a schematic of a label printer system according to another embodiment of the invention;

[0012] FIG. 3 is a flowchart of a label printing method according to one embodiment of the invention; and

[0013] FIG. 4 is a flowchart of a label printing method according to another embodiment of the invention.

PDNO 10008364

DETAILED DESCRIPTION

[0014] FIG. 1 is a schematic of a label printer system 100 according to one embodiment of the invention. The label printer system 100 includes a disk drive 110, a processor 133, and a memory 130. The disk drive 110 includes a rotational drive 113 capable of controlling the rotation of a disk storage medium 115, such as a CD or DVD disk, for example. The disk drive 110 further includes a transverse drive 121 capable of controlling a transverse motion of the laser head 118 toward the center of the disk storage medium 115. The disk drive 110 further includes a laser head 118, including at least a read laser 108 and a writing laser 109 for reading from and writing to the disk storage medium 115.

[0015] The processor 133 may be any type of general purpose processor capable of controlling the rotational drive 113 and the transverse drive 121 for normal disk read and write operations. In addition, the processor 133 is capable of controlling the rotational drive 113, the transverse drive 121, and the laser head 118 for a label printing operation.

[0016] The memory 130 may be any type of digital memory. The memory 130 may store, among other things, a disk orientation variable 149, a symbol set 146, a label printer driver 138, a disk rotational position 162, and a transverse position 166. In addition, the memory 130 may store software or firmware to be executed by the processor 133.

[0017] The processor 133 and memory 130 may comprise a specially programmed disk controller that is part of the disk drive 110. Alternatively, the processor 133 and the

PDNO 10008364

memory 130 may be part of a personal computer or work station (not shown), and may perform additional control of the disk drive 110.

[0018] The disk storage medium 115 may be any type of disk medium wherein a rotational and transverse drive are used to read and write data from the disk storage medium 115. This may include a CD disk, a DVD disk, etc.

[0019] The disk storage medium 115 includes a thermally-sensitive layer 117 that changes color when heated. The heating is accomplished by a writing laser. The color change may be used in order to form alpha-numeric characters, graphics, etc. The thermally-sensitive layer 117 may change to a black color when heated, for example. Alternatively, the thermally-sensitive layer 117 may change to other colors, as desired.

[0020] The thermally-sensitive layer 117 may be a layer deposited on the disk storage medium 115 or may be a label that is attached by an adhesive. The label may further be a permanent or peel-off label. In the case of a peel-off label, this would allow the user to later remove the label if the user significantly changed the contents of the disk storage medium 115.

[0021] The laser head 118 may include a read laser 108 and a writing laser 109, as is known in the art. The read laser 108 is generally a low power laser that cannot change the information bits on the disk storage medium 115, but is merely capable of detecting a state of an information bit. The writing laser 109 is of a higher power and can focus enough light energy on the disk storage medium 115 to change the state of information bits therein.

PDNO 10008364

[0022] The rotational drive 113 is capable of rotating the disk storage medium 115. The rotational drive 113 may be any suitable drive mechanism, including all manner of electric motors, geared electric motors, servo motors, stepper motors, etc.

[0023] The transverse drive 121 is capable of moving the laser head 118 transversely with respect to the disk storage medium 115. The motion may be approximately linear, or may be approximately arcuate. The laser head 118 alternatively may pivot with respect to the disk storage medium 115, such as in a computer hard drive. The transverse drive 121 may be any suitable drive mechanism, including all manner of electric motor and worm gear combinations, servo motors, stepper motors, etc.

[0024] The disk orientation variable 149 may indicate whether the disk storage medium 115 is in the disk drive 110 in an upright or inverted position. As will be discussed below, the laser head 118 may include merely the read laser 108 and the writing laser 109, as is known in the art. Because the disk drive 110 in this embodiment includes only a conventional read laser 108 and writing laser 109, the disk storage medium 115 will need to be inserted into the disk drive 110 in an inverted position, with a top surface of the disk storage medium 115 facing downward. As a result, the standard writing laser 109 of the disk drive 100 is positioned underneath the disk storage medium 115 and can be trained on the thermally-sensitive layer 117.

[0025] The symbol set 146 stores one or more alpha-numeric characters, images, icons, graphics, etc. The symbol set 146 therefore stores any symbol capable of being digitally represented and printed on the label of the disk storage medium 115.

PDNO 10008364

[0026] The label printer driver 138 is a software routine that interprets the symbol set 146 and converts it into a set of rotational and transverse movements and writing laser activations. The label printer driver 138 therefore enables the control of the rotational drive 113 and the transverse drive 121 in order to write the symbol set onto the thermally-sensitive layer 117 of the disk storage medium 115. The label printer driver 138 therefore may be a software driver that is loaded in order to operate the label printer function of the disk drive 110.

[0027] The disk rotational position 162 stores a current rotational position of the disk. The disk rotational position 162 may be used to track and control a rotational motion of the rotational drive 113.

[0028] The transverse position 166 stores the transverse displacement of the laser head 118. The transverse displacement is the motion of the laser head 118 toward or away from a central hub of the disk storage medium 115, in an approximately linear or arcuate path. The transverse position 166 may be used to track and control the transverse motion of the laser head 118.

[0029] In operation, the user inserts a disk storage medium 115 into the disk drive 110 in an inverted orientation. This inverted orientation will be reflected in the disk orientation variable 149. The thermally-sensitive layer 117 is therefore on the lower side of the disk storage medium 115, and is capable of being written to by the laser head 118. The processor 133 executes the label printer driver 138 and reads the data in the symbol set 146. Using the rotational position variable 162 and the transverse position variable 166, the processor 133 controls the rotational drive 113 and the transverse drive 121 in order to manipulate the laser head 118 with respect to the disk

PDNO 10008364

storage medium 115. The processor 133 therefore controls the disk drive 110 in order to train the writing laser 109 on the disk storage medium 115 in the patterns dictated by the symbol set 146, thereby writing label symbols to the disk storage medium 115. The thermally-sensitive layer 117 therefore may be heated in order to create any manner of alphanumeric symbols and/or graphics.

[0030] FIG. 2 is a schematic of a label printer system 200 according to another embodiment of the invention. In this second embodiment, a disk drive 210 further includes a label printer writing laser 214. All components in common with the first embodiment 100 share the same reference numerals. The label printer writing laser 214 is positioned above the disk storage medium 115, and as a result the disk storage medium 115 may be inserted in a normal, upright orientation. As a consequence, the disk drive 210 may write digital data to the disk storage medium 115 (using the laser head 118) while concurrently writing to a label on the upper side of the disk storage medium 115 (using the label printer writing laser 214). It should be noted that the label printer writing laser 214 may move concurrently with the laser head 118 (i.e., it may be moved by the transverse drive 121). Alternatively, a second transverse drive 221 may move the label printer writing laser 214, independently of the laser head 118. If a screw-type drive moves the label printer writing laser 214, it may be desirable to rotate the screw with respect to the second transverse drive 221 in order to retract the label printer writing laser 214 (for purposes of insertion and removal of the disk storage medium 115).

[0031] FIG. 3 is a flowchart 300 of a label printing method according to one embodiment of the invention. In step 302, the method detects whether the disk storage

PDNO 10008364

medium 115 is inverted. This is an optional step that may be performed if there is only a single writing laser 109 positioned below the disk storage medium 115. Such a configuration necessitates inversion of the disk storage medium 115 for a label printing operation. If the disk drive includes a label printer writing laser 214 positioned above the disk storage medium 115, this step is not needed. If the disk is inverted, then the method proceeds onto step 306; otherwise, it exits.

[0032] In step 306, a symbol set 146 is loaded. The symbol set 146 is a digital data contents of a desired label, as dictated by a user of the disk drive 110 or 210. The symbol set 146 may be programmed into the computer memory 130 by the user, and may be transferred onto the thermally-sensitive layer 117 of the disk storage medium 115 as part of the label printing process. For example, the symbol set 146 may include a disk name, a description of disk contents, a date, etc., and may further include any manner of graphics.

[0033] In step 313, a spot on the disk storage medium 115 is heated with the writing laser 109 or 214. The spot on the disk is heated to activate the thermally-sensitive layer 117 at the spot where the writing laser 109 or 214 is currently trained.

[0034] In step 324, the writing laser 109 or 214 is manipulated with regard to the disk storage medium 115. This may include transversely moving the laser head 118 or label printer writing laser 214, rotating the disk storage medium 115, or both. This is done to form a set of symbols as dictated by the symbol set 146. The manipulation therefore moves the laser illumination spot. In this manner, the writing laser 109 or 214 may form any manner of symbols and may form them on any area of the disk storage medium 115 that is covered by the thermally-sensitive layer 117.

PDNO 10008364

[0035] The label printer according to the invention allows the user to add to a label if a disk is reinserted. To add to an existing label, the label printer according to the invention will need to detect an existing label and detect an open or empty area on the thermally-sensitive layer 117. The label printer may further perform an erasing operation if the provided disk storage medium includes an erasing capability.

[0036] In an additional capability, the method may be used for color printing. The color printing may be done in any of several ways. In one embodiment, the thermally-sensitive layer 117 includes multiple layers and the writing laser 109 or 214 may be modulated to burn through the appropriate layers to produce a desired color. In another embodiment, the thermally-sensitive layer 117 may be arranged in a pattern, wherein the symbol set 146 may dictate which pattern areas are to be thermally activated in order to form a label composed of different colors. The pattern could be a series of substantially concentric rings of different colors, may be a substantially radial line pattern, may be substantially a grid, etc.

[0037] One additional requirement of the color printing is the need for precise positional information of the color pattern for precise positioning of a writing laser with regard to the pattern. This may be done through one or more alignment marks or an alignment pattern, may be done through a pre-reading of thermally sensitive layers, may be done through a test printing on a small area of the thermally-sensitive layer 117, such as near the hub, etc. Any test printing area may later be burned to black in order to obliterate such a test area.

PDNO 10008364

[0038] FIG. 4 is a flowchart 400 of a label printing method according to another embodiment of the invention. In step 403, a symbol set 146 is loaded, as previously discussed.

[0039] In step 407, one or more alignment marks on the disk storage medium 115 are read. The alignment marks may be pre-printed on the thermally-sensitive layer 117. The reading of the alignment marks may be done by the standard read laser 108 of the laser head 118. The alignment determination may be used in order to properly align a completed label according to a predetermined orientation, and may be especially applicable to color label printing. Alternatively, of course, the alignment marks could be printed on the thermally-sensitive layer 117 before the label printing procedure commences and as part of the label printing procedure.

[0040] In step 411, a spot on the disk storage medium 115 is heated with the writing laser 109 or 214, as previously discussed.

[0041] In step 418, the writing laser 109 or 214 is manipulated with regard to the disk storage medium 115 and the alignment marks. As before, the manipulating is done by the rotational drive 113 and the transverse drive 121 or 221, but is also done in conjunction with the detected alignment marks in order to position the symbols to be printed (and optionally in order to print color).

[0042] It should be noted that the finished label may include embedded information, including information about the disk storage medium 115. This embedded disk information may include information such as disk type, disk capacity, thermal sensitivity, locations of alignment marks, licensing information, etc. In addition, the label may come with pre-recorded data, such as a color layer pattern, a thermal sensitivity

PDNO 10008364

(i.e., how much laser power will be needed to activate the thermally sensitive layer); gray scale information such as a gray scale gamma curve; etc.

[0043] In addition, the disk drive 110 may be capable of learning a color pattern formed in the thermally sensitive layer, such as a self-calibration wherein test marks are written on a small area of the label in order to determine the color pattern. Any test marks may later be written to black in order to remove any undesired marks on the thermally sensitive layer 117.

[0044] The alignment marks may be detected by the standard read laser 108. Alternatively, in the embodiment of the disk drive 210 that includes two writing lasers, alignment marks could use a data side disk for alignment. Therefore, the standard read laser could look at a first readable data header and use that as an alignment mark for the label printing operation.

[0045] Another use of the alignment marks is for an eject operation. The alignment marks may be used to eject the disk storage medium 115 according to a predetermined orientation. As a result, the label may be oriented so as to be normally viewed and read by the user when ejected.

[0046] The invention differs from the prior art in that the invention uses a thermally-sensitive layer that may be activated by a writing laser of the disk drive. The label may be integral with the disk and can be burned in before or after a disk data writing operation. In addition, a label according to the invention may be written to more than one time. Furthermore, the label can be a separate label that is adhered to the disk storage medium 115 before the label printing operation. Consequently, the user may

PDNO 10008364

add the label to a previously written-to disk or may adhere more than one label to a particular disk.

[0047] The label printing according to the invention provides several benefits. The label printing provides easy printing of a label on any disk storage medium and is capable of printing a high quality label that can accommodate any combination of text or graphics. The label printing according to the invention requires only a few or no extra steps, and can use an existing writing laser of a disk drive. There is no ink or toner used in the disk drive to create maintenance problems. There is no ink or toner to smudge, no required ink or toner supply or replacement, and no additional maintenance load will be placed on the disk drive. Therefore, there is no need to independently track supplies, as the printable medium may be purchased on individual disks. In addition, the label printing according to the invention may be used to create color labels and designs.

[0048] Another benefit according to the invention is that the label printed in the invention may be used to retrofit and reconfigure an existing disk drive with a new software routine in order to enable label printing according to the invention.

[0049] In an additional benefit, the user may be able to digitally create label information and download it and print it onto the disk storage medium 115 as part of the normal digital data writing to the data side of the disk storage medium 115. Therefore, the label printing could be done automatically and all the user has to do is specify the label information.

PDNO 10008364

We claim:

1. A label printer system, comprising:
a disk storage medium including a thermally-sensitive layer formed on at least a portion of an upper surface of said disk storage medium;
a rotational drive for rotating said disk storage medium;
a transverse drive including a laser head for moving a laser of said disk drive substantially transversely with respect to said disk storage medium;
a memory including a symbol set and a label printer driver; and
a processor communicating with said memory, said rotational drive, said transverse drive, and said laser, and wherein said processor uses said label printer driver to control said rotational drive and said transverse drive in order to thermally write said symbol set to said thermally-sensitive layer of said disk storage medium using said laser.
2. The system of claim 1, wherein said memory further includes a rotational position variable that tracks a rotational position of said disk storage medium.
3. The system of claim 1, wherein said memory further includes a transverse position variable that tracks a transverse position of said laser head.
4. The system of claim 1, wherein said memory further includes a disk orientation variable that tracks an orientation of said disk storage medium.

PDNO 10008364

5. The system of claim 1, wherein said laser head comprises a read laser and a writing laser positioned below said disk storage medium, with said writing laser being used to thermally write to said thermally-sensitive layer.

6. The system of claim 1, wherein said laser head comprises a read laser and a writing laser positioned below said disk storage medium and further comprises a label printer writing laser positioned above said disk storage medium, with said label printer writing laser being used to thermally write to said thermally-sensitive layer.

PDNO 10008364

7. A label printing method for a disk storage medium, comprising the steps of:

loading a symbol set to a processor controlling a disk drive, with said symbol set including one or more predetermined symbols or graphics to be written to said disk storage medium;

heating with a laser a thermally-sensitive layer formed on at least a portion of an upper surface of said disk storage medium; and

manipulating said laser with respect to said disk storage medium;

wherein said symbol set controls the manipulating step in order to write said one or more predetermined symbols or graphics to said thermally-sensitive layer.

8. The method of claim 7, wherein said disk drive includes a read laser and a writing laser positioned below said disk storage medium, and further comprising the preliminary step of detecting an orientation of said disk storage medium, and wherein the heating step is performed by said writing laser and the loading, heating, and manipulating steps are performed if said disk storage medium is inverted.

9. The method of claim 7, wherein said disk drive includes a read laser and a writing laser positioned below said disk storage medium and a label printer writing laser positioned above said disk storage medium, and wherein the heating step is performed by said label printer writing laser.

PDNO 10008364

10. The method of claim 7, further comprising the steps of:
- rotating said disk storage medium;
 - transversely moving said laser with respect to said disk storage medium;
 - tracking a rotational position of said disk storage medium in a rotational position variable; and
 - tracking a transverse position of said laser in a transverse position variable;
- wherein said rotational position and said transverse position are used by said processor for manipulating said laser with respect to said disk storage medium.
11. The method of claim 7, further comprising the step of reading one or more alignment marks on said disk storage medium.

PDNO 10008364

12. A label printing method for a disk storage medium, comprising the steps of:
- loading a symbol set to a processor controlling a disk drive, with said symbol set including one or more predetermined symbols or graphics to be written to said disk storage medium;
 - reading one or more alignment marks on said disk storage medium;
 - heating with a laser a thermally-sensitive layer formed on at least a portion of an upper surface of said disk storage medium; and
 - manipulating said laser with respect to said disk storage medium;
- wherein said symbol set in conjunction with said one or more alignment marks controls the manipulating step in order to write said one or more predetermined symbols or graphics to said thermally-sensitive layer.
13. The method of claim 12, wherein said one or more alignment marks are used to align a completed label according to a predetermined orientation.
14. The method of claim 12, wherein said one or more alignment marks are pre-printed on said thermally-sensitive layer.
15. The method of claim 12, wherein said one or more alignment marks were previously written to a data contents of said disk storage medium.

PDNO 10008364

16. The method of claim 12, further comprising the preliminary step of printing said one or more alignment marks to said thermally-sensitive layer before the loading step.

17. The method of claim 12, further comprising the step of ejecting said disk storage medium according to a predetermined orientation using said one or more alignment marks.

18. The method of claim 12, wherein said laser comprises a writing laser positioned below said disk storage medium, and further comprising the preliminary step of detecting an orientation of said disk storage medium, and wherein the heating step is performed by said writing laser and the loading, heating, and manipulating steps are performed if said disk storage medium is inverted.

19. The method of claim 12, wherein said laser comprises a label printer writing laser positioned above said disk storage medium, and wherein the heating step is performed by said label printer writing laser.

PDNO 10008364

20. The method of claim 12, further comprising the steps of:

- rotating said disk storage medium;
- transversely moving said laser with respect to said disk storage medium;
- tracking a rotational position of said disk storage medium in a rotational position variable; and
- tracking a transverse position of said laser in a transverse position variable;

wherein said rotational position and said transverse position are used by said processor for manipulating said laser with respect to said disk storage medium.

PDNO 10008364

ABSTRACT

A label printer system includes a disk storage medium including a thermally-sensitive layer formed on at least a portion of an upper surface. A rotational drive rotates the disk storage medium and a transverse drive moves a laser substantially transversely with respect to the disk storage medium. A memory includes a symbol set and a label printer driver. A processor uses the label printer driver to control the rotational drive and the transverse drive in order to thermally write the symbol set to the thermally-sensitive layer of the disk storage medium, using the laser.

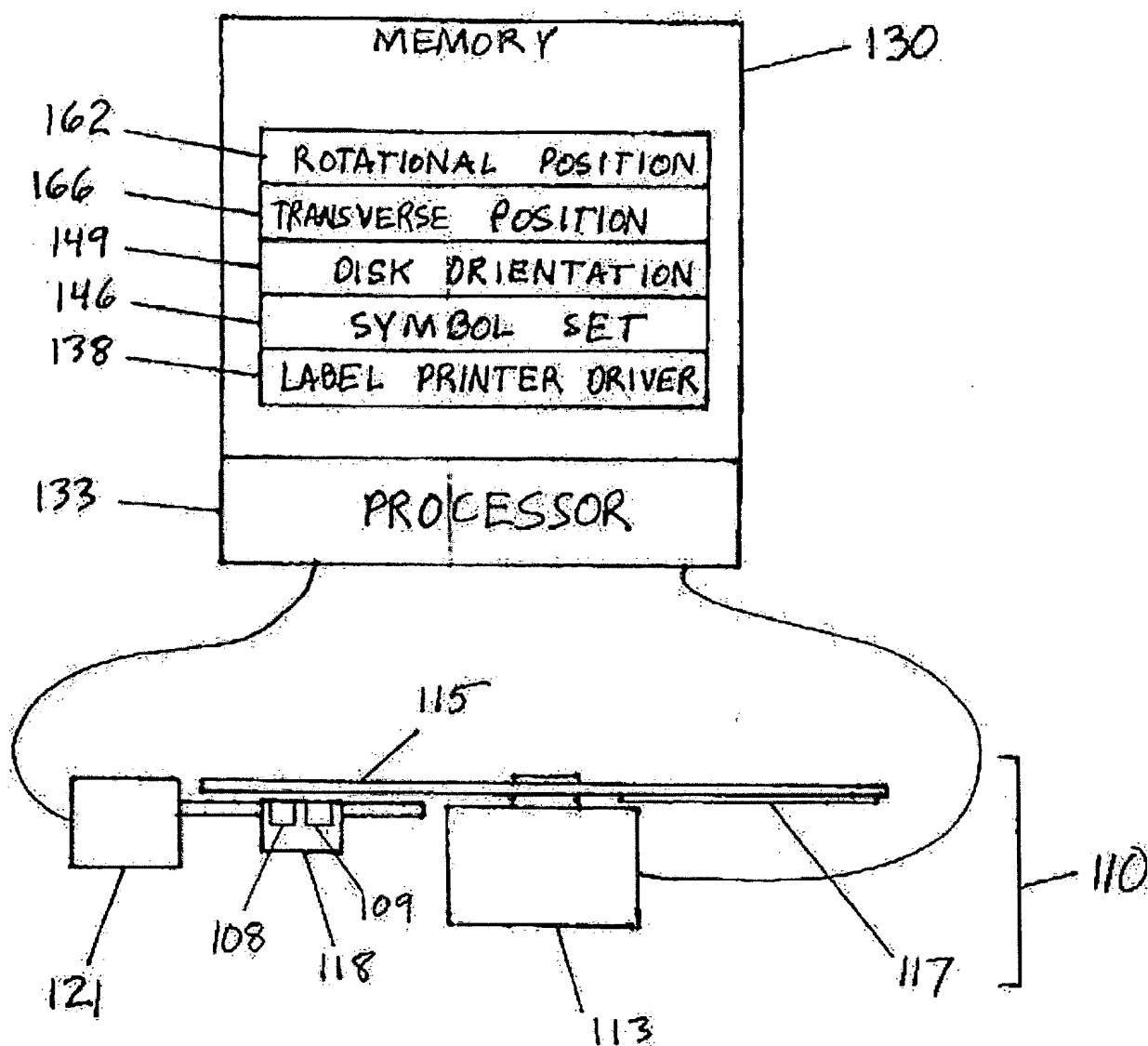
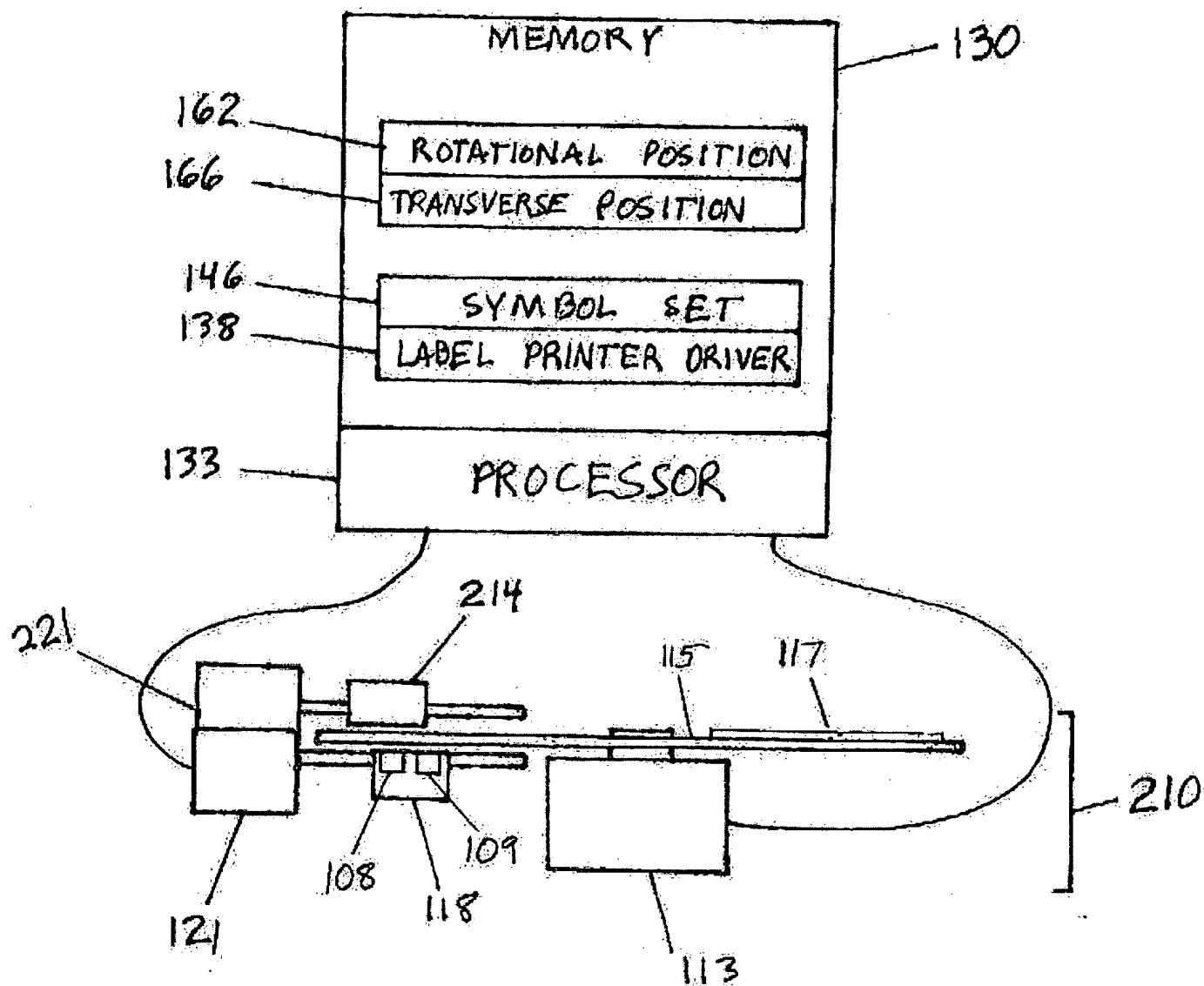


FIG. 1



200

FIG. 2

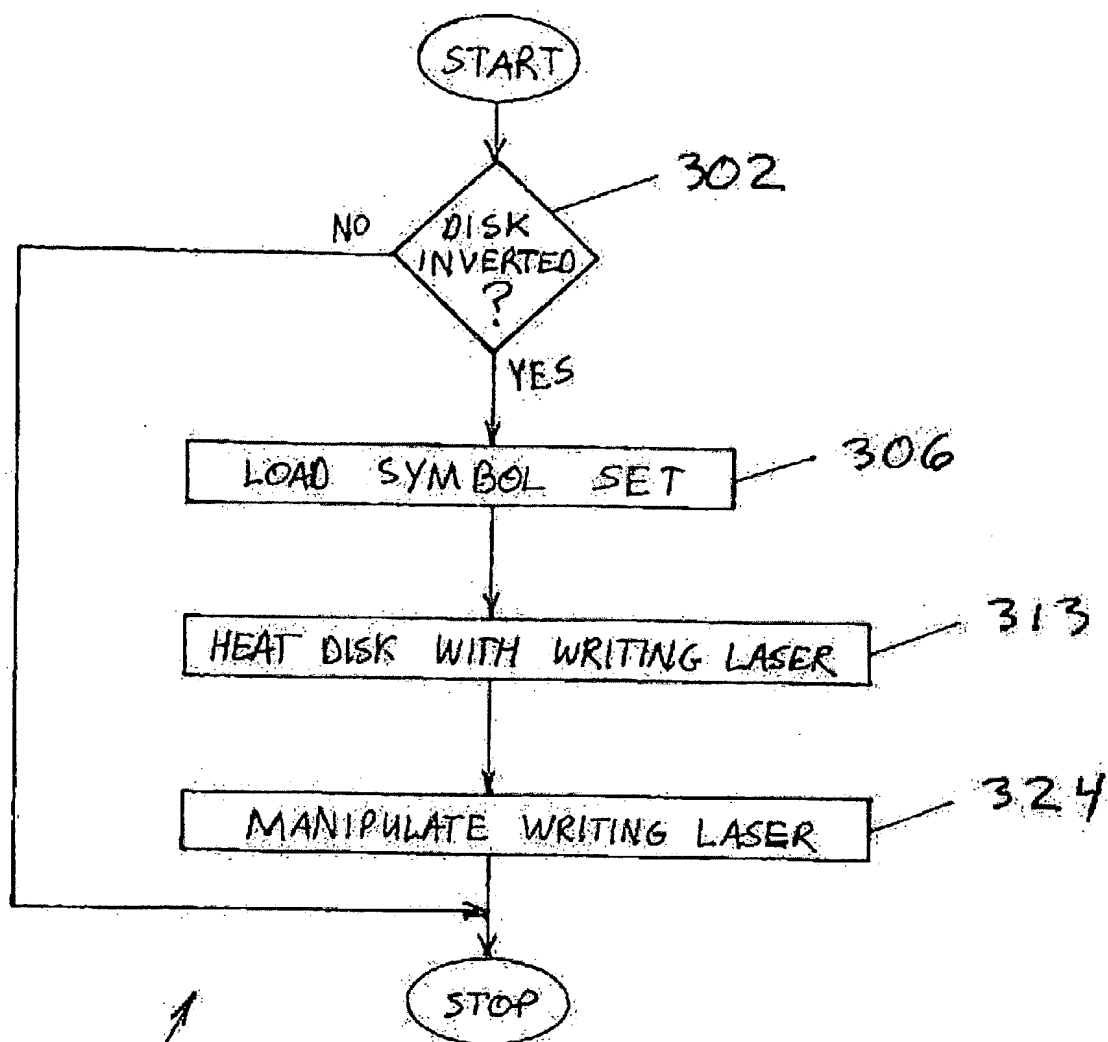


FIG. 3

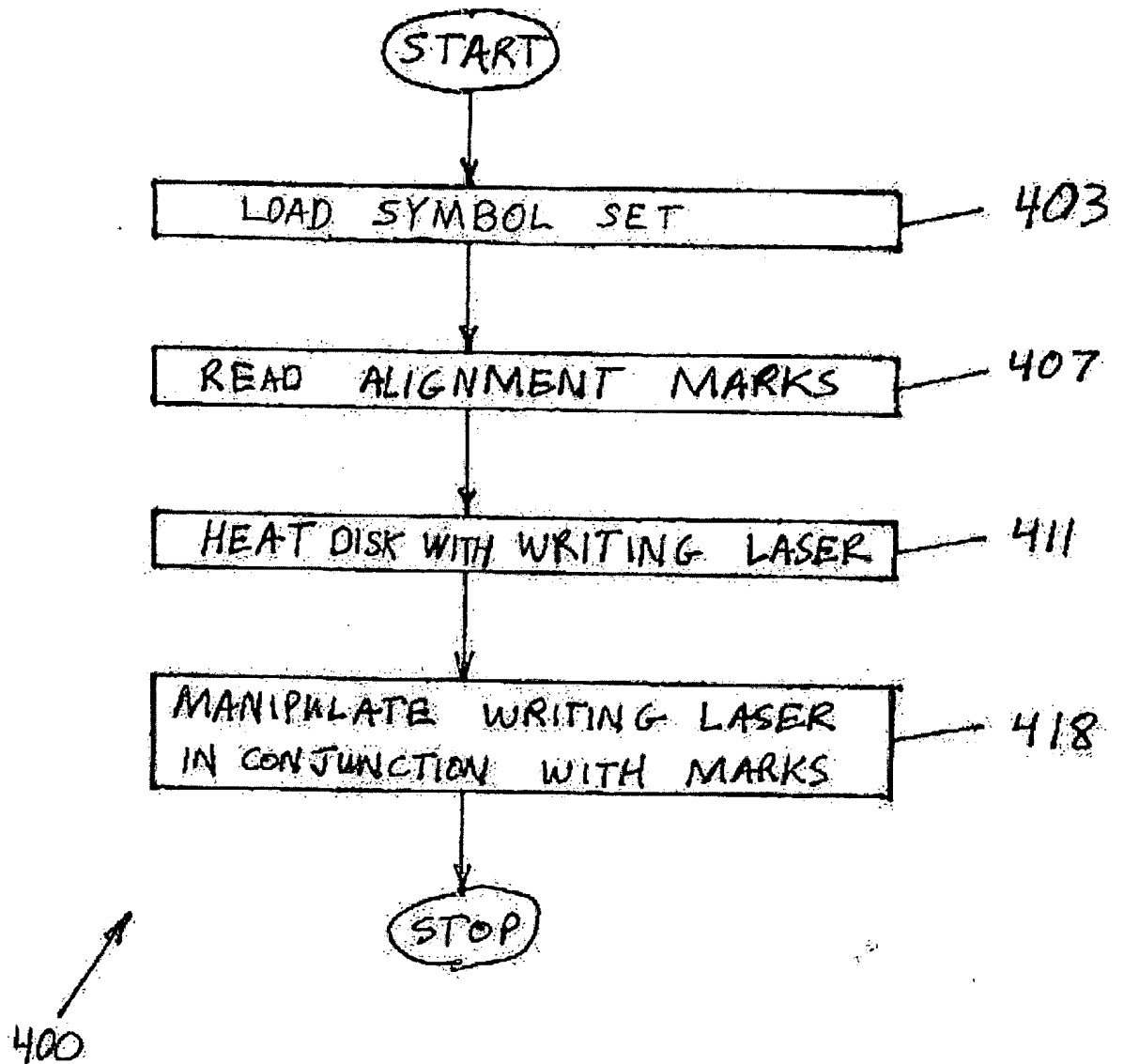


FIG. 4

PDNO 10008364.txt

From: Gregg Jansen [gjansen@tcon1.com]
Sent: Friday, December 28, 2001 9:37 AM
To: barry_bronson@hp.com
Subject: PDNO 10008364

Hello Barry,

I hope your holidays were good. I am currently faxing a first draft of your patent application. Please review it and provide me with any changes, additions, or corrections you may have. Also please let me know if you would like to have any changes made to the drawings. When you are satisfied with the drawings, I will send them to our draftsman for finalizing. Thanks.

Regards,
Gregg

--

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Gregg Jansen
Rothwell, Figg, Ernst & Manbeck, P.C.
13906 Gold Circle, Suite 204
Omaha, NE 68144
phone: (402) 333-1550
fax: (402) 333-1510
e-mail: gjansen@rothwellfigg.com

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WASHINGTON, D.C. OFFICE
COLUMBIA SQUARE
SUITE 701 EAST TOWER
555 THIRTEENTH STREET, N.W.
WASHINGTON, D.C. 20004

(202) 783-6040

January 3, 2002

Mr. Barry Bronson
Hewlett-Packard Company
MS 3U-14
1501 Page Mill Road
Palo Alto, CA 94304-1126

Via Overnight Delivery

RE: Patent Application Forms for "Labeling Apparatus and Method for Disk Storage Media"
HP PDNO 10008364-1; Our Docket No.: N1424-037

Dear Barry:

Enclosed is a Declaration/Power of Attorney and Assignment for you to sign and date for the above-referenced patent application. Do not sign the documents until we have arrived at a final patent application. If you have any additional corrections, additions, or changes, please let me know as soon as possible and hold on to the forms.

When signing the documents, please sign them with BLUE ink. As you are presently employed with Hewlett-Packard, you do not need to sign the Assignment in the presence of a notary public.

Also enclosed is a second draft of the patent application, incorporating the feedback I received on the first draft. The second draft contains a strikethrough for deleted material and new material is in bold. I have also included another set of the informal drawings.

Please send the forms back to me as soon as possible after signing (via some form of overnight delivery), so that I can file the patent application.

Sincerely,


Gregg Jansen

/sav
Enclosures

Filing Procedures Checklist
 For Outside Counsel
 When Filing USPTO Application
Customer Number 022879

HP PDNO: 10008364-1 Date for Receipt by HP: Feb. 23, 2002
 Your ref. No: 21424-037 Date to be Filed in USPTO: Feb. 23, 2002

Outside Counsel is responsible for returning ALL items unless marked by "N/A"

NEW APPLICATIONS

- ☒ Request for Quote executed and returned to HP for signature (via FAX or email) within 10 business days
- ☒ Confirmation RFQ received from HP
- ☒ Final draft approved by inventor(s) and HP Responsible Attorney as necessary and submitted to HP
- ☒ Confirmation postcard addressed to HP*
- ☒ Copy of all filing documents for HP's file within one week from filing date
- ☒ Prepared Transmittal Letter
- ☒ Executed Declaration and Power of Attorney indicating HP as correspondent
- ☒ Original executed Assignment (returned to HP for filing later)
- ☒ Copy of Application on A4 paper according to PCT header and margin requirements
- ☒ Set of Reduced Claims and Abstract with reference numbers for foreign filing
- ☒ Formal drawings according to PCT (Delete EPO) format
- ☒ IDS (if applicable), Form 1449 and copy of cited references
- ☒ Electronic copy of application on diskette or CD (not via email or internet)
- ☒ Electronic copy of drawings as .pdf file on same diskette
- ☒ Copy of transmittal and Declaration faxed to HP **on date application mailed to USPTO by O/C**
- ☒ Shortest independent claim having 175 words or less
- N/A Prepare Request for Non-US Publication Under 35 U.S.C. 122(b)(2)(B)(i)
- N/A Prepare Request for Early Publication

Dee E Timmons
 Hewlett-Packard Company
 1501 Page Mill Road
 Mailstop 4U-10
 Palo Alto, CA 94304-1126

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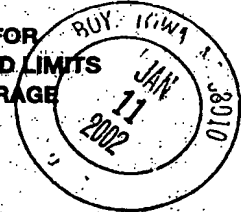


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ROTHWELL, FIGG, ERNST & MANBECK

13906 Gold Circle - Suite 204

Omaha, Nebraska 68144

Telephone (402) 333-1550

Fax (402) 333-1510

E-mail gjansen@rothwellfigg.com

FACSIMILE INFORMATION SHEET

DATE: January 11, 2002

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THE FOLLOWING PAGES ARE FOR:

Individual: Susan E. Heminger
Company: Hewlett-Packard Company
Fax No.: 650/852-8063
Transmitting Party: Gregg Jansen
ROTHWELL, FIGG, ERNST & MANBECK

Total Number of Pages Transmitted, including this sheet: 3

HP Reference No.: PDNO 10008364-1

Message: Sue:

Enclosed is a copy of the patent application transmittal filed by Express Mail to the United States Patent Office today. A complete copy will be sent to you under separate cover by regular U.S. mail.

Gregg

01/11/2002 14:38 FAX 4023331510

ROTHWELL FIGG OMAHA

002/003

HEWLETT-PACKARD COMPANY
Intellectual Property Administration
P. O. Box 272400
Fort Collins, Colorado 80527-2400

PATENT APPLICATION
ATTORNEY DOCKET NO. 10008384-1

IN THE U.S. PATENT AND TRADEMARK OFFICE
Patent Application Transmittal Letter

COMMISSIONER FOR PATENTS
Washington, D.C. 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is a(n): ☒ Utility ☐ Design☒ original patent application.☐ continuation-in-part application

INVENTOR(S): Barry Bronson

TITLE: Labeling Apparatus and Method for Disk Storage Media

Enclosed are:

- ☒ The Declaration and Power of Attorney. ☒ signed ☐ unsigned or partially signed
☒ 4 sheets of drawings (one set) ☐ Associate Power of Attorney
☐ Form PTO-1449 ☒ Information Disclosure Statement and Form PTO-1449
☐ Priority document(s) ☐ Other (fee \$)

CLAIMS AS FILED BY OTHER THAN A SMALL ENTITY				
(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) TOTALS
TOTAL CLAIMS	21 — 20	1	X \$18	\$ 18
INDEPENDENT CLAIMS	3 — 3	0	X \$84	\$ 0
ANY MULTIPLE DEPENDENT CLAIMS	0		\$280	\$ 0
BASIC FEE: Design (\$330.00); Utility (\$740.00)				\$ 740
TOTAL FILING FEE				\$ 758
OTHER FEES				\$
TOTAL CHARGES TO DEPOSIT ACCOUNT				\$ 758

Charge \$ 758 to Deposit Account 08-2025. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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Date of Deposit Jan. 11, 2001

I hereby certify that this is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to: Commissioner for Patents, Washington, D.C. 20231

By Shirley A. Votrohek
Typed Name: Shirley A. Votrohek

Respectfully submitted,

Barry Bronson

By Gregg Jansen

Gregg Jansen

Attorney/Agent for Applicant(s)

Reg. No. 46,799

Date: Jan. 11, 2001

Telephone No.: (402) 333-1550

LAW OFFICES
ROTHWELL FIGG ERNST & MANBECK
 A PROFESSIONAL CORPORATION
 1425 K STREET, N.W.
 SUITE 800
 WASHINGTON, D.C. 20005
 TELEPHONE (202) 783-6040
 I.R.S. NO. 52-1101097

*Susan,
 Please provide
 the subcase.*

*Thanks,
 Rhonda*

*To Finance
 4-8-02*

HEWLETT-PACKARD COMPANY
 Legal Department, M/S 1068
 P.O. Box 10301
 Palo Alto, CA 94303-0890
Attention: Financial Administrator

February 28, 2002
 Client: N1424
 Matter: 000037
 Invoice #: 91690

Page: 1

RE: Patent Matter
 Title: LABELING APPARATUS AND METHOD FOR DISK
 STORAGE MEDIA
 Your Reference: HP 10008364
 Attorney: Susan E. Heminger

*CT 194:24
 SEH*

For Professional Services Rendered Through January 31, 2002

SERVICES

Date	Person	Description of Services	Hours	Rate	Amount
09/14/2001	GLJ	Search.	0.90	\$195.00	\$175.50
09/19/2001	GLJ	Review search results.	0.20	\$195.00	\$39.00
10/01/2001	GLJ	Work on drawings and outline.	3.00	\$195.00	\$585.00
10/02/2001	GLJ	Work on outline.	1.10	\$195.00	\$214.50
10/03/2001	GLJ	Interview inventor; revise outline.	0.80	\$195.00	\$156.00
10/04/2001	GLJ	Revise outline and drawings.	1.40	\$195.00	\$273.00
10/05/2001	GLJ	Telephone conference with inventor.	0.80	\$195.00	\$156.00
10/08/2001	GLJ	Work on description, background and drawings.	1.10	\$195.00	\$214.50
10/09/2001	GLJ	Work on description and drawings.	5.50	\$195.00	\$1,072.50
10/10/2001	GLJ	Work on description and claims.	2.30	\$195.00	\$448.50
10/11/2001	GLJ	Work on claims, summary, description and drawings.	4.80	\$195.00	\$936.00
11/30/2001	VMD	Review and revise draft patent application.	1.70	\$355.00	\$603.50

February 28, 2002

Client: N1424

Matter: 000037

Invoice #: 91690

Page: 2

SERVICES

Date	Person	Description of Services	Hours	Rate	Amount
12/28/2001	GLJ	Complete draft; send to inventor.	0.55	\$192.73	\$106.00
Total Professional Services			24.15		\$4,980.00

PERSON RECAP

Person	Hours	Rate	Amount
VMD VINCENT M. DELUCA	1.70	\$355.00	\$603.50
GLJ GREGG L. JANSEN	0.55	\$192.73	\$106.00
GLJ GREGG L. JANSEN	21.90	\$195.00	\$4,270.50

DISBURSEMENTS

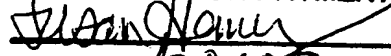
Description of Disbursements	Amount
Formal Drawings	\$120.00
Total Disbursements	\$120.00

Total Services	\$4,980.00
Total Disbursements	\$120.00
Total Current Charges	\$5,100.00
TOTAL AMOUNT DUE	\$5,100.00

FAU

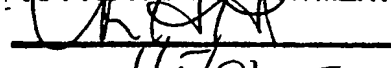
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APPROVED FOR PAYMENT


 3/28/02
 Date

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 4/5/02
 Date



INVENTION DISCLOSURE

PDNO 10008364

DATE RCVD [REDACTED]

PAGE ONE OF

ATTORNEY *Sum*

actions: The information contained in this document is **COMPANY CONFIDENTIAL** and may not be disclosed to others without prior authorization. Submit this disclosure to the HP Legal Department as soon as possible. No patent protection is possible until a patent application is authorized, prepared, and submitted to the Government.

Descriptive Title of Invention:

CD Writer Thermal Printing Labels

Name of Project:

None

Product Name or Number:

None

Was a description of the invention published, or are you planning to publish? If so, the date(s) and publication(s):
NoWas a product including the invention announced, offered for sale, sold, or is such activity proposed? If so, the date(s) and location(s):
NoWas the invention disclosed to anyone outside of HP, or will such disclosure occur? If so, the date(s) and name(s):
No

If any of the above situations will occur within 3 months, call your IP attorney or the Legal Department now at 1-898-4919 or 970-898-4919.

Was the invention described in a lab book or other record? If so, please identify (lab book #, etc.) No

Was the invention built or tested? If so, the date: No

Was this invention made under a government contract? If so, the agency and contract number: No

Description of Invention: Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).

- A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).
- B. Problems solved by the invention.
- C. Advantages of the invention over what has been done before.
- D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

Signature of Inventor(s): Pursuant to my (our) employment agreement, I (we) submit this disclosure on this date: [REDACTED].

5103 Barry Bronson

Employee No. Name

Signature

857-3033

3U-14

HPL

Telnet

Mailstop

Entity Acronym



INVENTION DISCLOSURE

COMPANY CONFIDENTIAL

PAGE ____ OF ____

Signature of Witness(es): (Please try to obtain the signature of the person(s) to whom invention was first disclosed.)

The invention was first explained to, and understood by, me (us) on this date:

Full Name

Joshua Rosenberg

Signature

[Signature]

Date of Signature

Full Name

Signature

Date of Signature

Inventor & Home Address Information: (If more than four inventors, include addl. information on a copy of this form & attach to this document)

Inventor's Full Name

Barry Bronson

Street

13750 Via Alto Court

City

Saratoga

State

CA

Zip

95070

Do you have a Residential P.O. Address? P.O. BOX

City

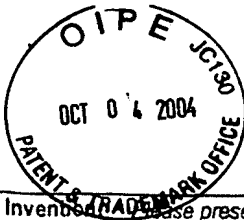
State

Zip

listed as (nickname, middle name, etc.)

Citizenship

USA¹



Description of Invention. Please preserve all records of the invention and attach additional pages for the following. Each additional page should be signed and dated by the inventor(s) and witness(es).

A. Prior solutions and their disadvantages (if available, attach copies of product literature, technical articles, patents, etc.).

Prior solutions including PNDO 10005058 and USPTO 6074031 describe a discrete print mechanism and ink supply integrated in or with a CDRW or DVDRW drive that can print labels on the recording media. These approaches add cost, bulk, and maintenance (replacing consumables) to a basic drive.

B. Problems solved by the invention.

The invention eliminates the need for an ink supply and other additional parts by using the existing laser writing device to write to a thermally sensitive label or coating on the recording media.

C. Advantages of the invention over what has been done before.

To date, labels have been printed on a printer or by hand and then attached to a writable disk. With the conventions specified in section A, the writing can be done within the disk writer directly on the disk, but require additional moving hardware components and a replaceable ink supply. This invention can be implemented at minimal incremental cost, will not increase the form factor of the device, and will not require the replacement of consumables.

D. Description of the construction and operation of the invention (include appropriate schematic, block, & timing diagrams; drawings; samples; graphs; flowcharts; computer listings; test results; etc.)

The invention uses the writing laser diode in an optical disk writer to heat a thermal sensitive coating on a disk or the coating on an attached label on the label side of a writable optical disk (CDRW, DVDRW, et al). The thermal sensitive coating can be similar to thermal FAX paper in that it changes from white to black when heated. In operation, the disk would be removed, turned over, and re-inserted. The disk rotation and laser servo subsystems would be used to position the laser to write very high-resolution markings on the label side of the disk. Color printing could be achieved by making the thermal coatings multi-layer or color patterned (under a white top surface). In the multi-layer approach, the laser could be modulated to burn through the appropriate number of layers to reach the intended color. In a color patterned coating, pre-printed alignment marks could be read by the drive to align the laser, then the printing laser would be directed to burn through the top layer to expose one or more color sub-pixels. An additional claim is that the disk could be ejected with the label always be properly aligned (top to bottom) for easy reading.

Request for Quote and Engagement Letter Agreement

RE: Hewlett-Packard Docket No.10008364-1

Application No.:

Confirmation No.:

- ☒ This is a request for a quote for the following services:
☐ This is a confirmation of your quote for the following services:

please proceed
9/6/01

PREPARE

- ☒ Application ☒ File with USPTO
☐ Response ☐ Return to HP for filing
☐ Other _____

☒ YOUR FINISHED PRODUCT TO HP SHOULD INCLUDE ALL ITEMS ON THE ENCLOSED CHECKLIST.

HP REQUIRED DATES: _____ Date for Receipt by HP
02/23/2002 Date to be Filed in PTO

HP Attorneys of Record: (to be included on the Declaration)

Customer Number 022879

HP Primary Technical Contact: Barry Bronson

Telephone No.: (650) 857-3033 FAX No.:

HP Entity: SBF

Address: 1501 Page Mill Road, M/S 3U-14
Palo Alto, CA 94304**ADDITIONAL TERMS OR INSTRUCTIONS:**TOTAL PRICE: \$ 5,100 (including Formal drawings)

I agree to the terms of this Agreement including the additional terms above, pursuant to the HP Procedures for Outside Counsel revised OCTOBER 16, 1999, a copy of which I have received and reviewed. This Agreement will not be binding on either party until signed by an authorized representative of HP.

ROTHWELL, FIGG, ERNST & MANBEC

HEWLETT-PACKARD COMPANY

By: Gregg L. Jansen
Gregg L. JansenBy: Susan E. Heminger
Susan E. HemingerDated: 8/29/01Dated: 9/5/01

Rev02/01 (ELA)

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**Request for Quote and Engagement Letter Agreement**

RE: Hewlett-Packard Docket No.10008364-1

Application No.:

Confirmation No.:

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☐ Response ☐ Return to HP for filing
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☒ YOUR FINISHED PRODUCT TO HP SHOULD INCLUDE ALL ITEMS ON THE ENCLOSED CHECKLIST.**HP REQUIRED DATES:**02/23/2002

Date for Receipt by HP

Date to be Filed in PTO

HP Attorneys of Record: (to be included on the Declaration)Customer Number **022879****HP Primary Technical Contact:**

Barry Bronson

Telephone No.: (650) 857-3033

FAX No.:

HP Entity: SBF

Address: 1501 Page Mill Road, M/S 3U-14
Palo Alto, CA 94304**ADDITIONAL TERMS OR INSTRUCTIONS:**TOTAL PRICE: \$ 5,100 (including Formal drawings)

I agree to the terms of this Agreement including the additional terms above, pursuant to the HP Procedures for Outside Counsel revised **OCTOBER 15, 1999**, a copy of which I have received and reviewed. This Agreement will not be binding on either party until signed by an authorized representative of HP.

ROTHWELL, FIGG, ERNST & MANBEC**HEWLETT-PACKARD COMPANY**By: Gregg L. Jansen

Gregg L. Jansen

Dated: 8/29/01By: Susan E. Heminger

Susan E. Heminger

Dated: 9/5/01

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